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Trends in Survival at the Older Ages

THE spectacular reductions in mortality during recent decades among children and young adults have tended to obscure the substantial progress made at the older ages. An insight into the trend of mortality and longevity in later life may be gained from the table on page 2. The data, shown separately for white males and white females at every fifth age from 60 to 80 years, begin with the period 1929-31, the earliest for which nationwide figures are available.

The mortality rate was appreciably lower in 1958 than in 1929-31 among older persons of each sex. Among white males, a reduction was recorded at each age from 60 to 80 years, the decrease averaging about 13 percent. The largest *relative* decline in mortality among the males occurred during the decade of the 1940's, but substantial progress was also made both during the 1930's and in the early 1950's. More recently there have been small increases in mortality among white males, associated, in part at least, with the unusually high prevalence of respiratory diseases.

Particularly noteworthy are the *absolute* reductions in mortality during the period under review. For example, among white males at age 60 the death rate fell from 26.4 per 1,000 in 1929-31 to 22.6 in 1958, a decrease of 3.8 per 1,000. Similarly, at age 75 the rate dropped from 85.3 to 73.3, or by 12.0 per 1,000. These reductions at ages 60 and 75 take on added significance when it is observed that they are equal to the total mortality currently experienced by white males at ages 41 and 52, respectively.

Women have made considerably greater gains than men, on both an absolute and a relative basis. Since 1929-31, the relative reductions in the death rate for white women have amounted to as much as 47 percent at age 60, to about 40 percent at age 65, and to more than 30 percent up through age 80. Moreover, at most of the older ages the mortality rates for women reached their lowest levels in 1958.

As a result of the sex differences in trend, the excess of male over female mortality has risen rapidly. In 1929-31, the excess ranged from 28 percent at age 60 to 11 percent at age 80. By 1958, it was as much as 107 percent at age 60 and 32

MORTALITY, EXPECTATION OF LIFE, AND SURVIVAL AFTER AGE 60

White Population by Sex, United States, 1929-1958

Period	White Male					White Female				
	60	65	70	75	80	60	65	70	75	80
	Annual Mortality Rate per 1,000									
1929-31	26.4	38.7	58.0	85.3	130.0	20.6	31.3	48.7	74.6	117.4
1939-41	25.5	36.9	54.5	83.1	124.7	17.1	26.4	42.3	68.9	108.2
1949-51	23.8	34.5	50.3	75.0	109.9	13.4	20.6	34.1	56.5	90.6
1954	22.4	34.5	48.4	70.4	105.2	11.5	19.6	30.4	50.5	83.4
1958	22.6	35.6	52.6	73.3	107.1	10.9	18.9	31.6	48.9	81.1
	Expectation of Life in Years									
1929-31	14.7	11.8	9.2	7.0	5.3	16.1	12.8	10.0	7.6	5.6
1939-41	15.1	12.1	9.4	7.2	5.4	17.0	13.6	10.5	7.9	5.9
1949-51	15.8	12.8	10.1	7.8	5.9	18.6	15.0	11.7	8.9	6.6
1954	16.2	13.1	10.5	8.2	6.3	19.4	15.7	12.4	9.4	7.0
1958	15.7	12.7	10.1	7.8	5.8	19.2	15.4	12.0	9.1	6.4
	Chances per 1,000 of Surviving for 10 Years									
1929-31	676	556	411	257	137	729	612	462	295	161
1939-41	689	573	425	270	142	766	650	495	324	175
1949-51	707	600	464	315	175	811	709	563	392	228
1954	711	611	485	333	*	824	734	598	418	*
1958	702	590	470	312	*	828	730	605	413	*

*Not available.
Source: Various reports by the Bureau of the Census, the National Office of Vital Statistics, and the Statistical Bureau of the Metropolitan Life Insurance Company.

percent at age 80. It is worth noting, moreover, that at ages 60 to 70 the mortality rates for white males in 1958 were higher than those for white females in 1929-31.

These recent shifts in mortality have their counterpart in the longevity record. The table shows, for example, that white females at age 60 had an expectation of life of 19.2 years in 1958; this marks a gain of 3.1 years since 1929-31. At age 80, the remaining lifetime averaged 6.4 years in 1958, an increase of only 0.8 of a year. White males have not done as well. Their expectation of life at age 60 in 1958, namely, 15.7 years, was only one year greater than in 1929-31. At age 80, the average remaining lifetime for white males increased to 5.8 years, a gain of just one half year. As in the case of mortality, the longevity record for white males in 1958 was very much like that for white females in 1929-31. When the recent longevity records for the two sexes are compared, it is seen that white females have an advantage of 3.5 years at age 60, almost 2 years at age 70, and a little over one half year at age 80.

A reflection of the improvement in mortality and longevity is seen in the increased chances of older people to survive an additional 10 years; the figures are set forth in the lowest tier of the table. For those currently reaching age 65, the chances of living for at least another ten years are almost 3 in 5 for white males and 3 in 4 for white females. Even at age 75, the chances of survival for 10 years are still appreciable—almost 1 in 3 for white males and more than 2 in 5 for white females. The more favorable experience for women adds to the problem of widowhood in later life.

The improved record of longevity at the older ages reflects the remarkable advances in medicine and public health and their widespread application, the expansion of hospital facilities and services, better nutrition, fuller knowledge of personal hygiene, and the general rise in living standards. The trend of the major causes of death among older people and the outlook for the years ahead will be discussed in subsequent issues of the Statistical Bulletin.

Joint Effect of Blood Pressure Level and Impairments*

THE relatively high mortality found among persons with above-average blood pressure is increased further when certain impairments generally considered to be of minor significance are also present. The pertinent data are contained in the Build and Blood Pressure Study, 1959, conducted by the Society of Actuaries, which in-

*This is the tenth of a series of articles dealing with the major findings and implications of the *Build And Blood Pressure Study, 1959*, recently published by the Society of Actuaries. This investigation covered the experience of several million people insured by 26 large Life insurance companies in the United States and Canada during the period 1935-53.

vestigated the mortality of insured persons according to the degree of elevated blood pressure, analyzing separately the experience for those with and for those without known minor impairments. Further analyses were also made of specific categories of minor impairments. The findings are summarized here for males only, since the volume of data for them was relatively large. For purposes of this study, a minor impairment was one which would not bar the applicant from obtaining standard insurance.

Table 1 shows, by age at issue and degree of elevation of blood pressure, the mortality among men with systolic or diastolic pressure above average, classified according to the presence or absence of minor impairments. The mortality in each classification is expressed as a percent of that for all standard risks in the respective age groups. Not only is the mortality generally higher among men with minor impairments, but also the excess mortality tends to increase with degree of elevation of blood pressure in every age group. Thus, at issue ages 30-39 the mortality among men with

TABLE 1—MORTALITY OF MEN WITH ABOVE-AVERAGE BLOOD PRESSURE SEPARATELY FOR THOSE WITH AND THOSE WITHOUT KNOWN MINOR IMPAIRMENTS

Mortality Ratios for Various Degrees of Elevated Blood Pressure
Men Accepted for Ordinary Insurance in 1935-53
Traced to Policy Anniversary in 1954. By Age at Issue

Degree of Elevated Blood Pressure†	Mortality Ratio (Percent)*					
	Ages 30-39		40-49		50-59	
	Minor Impairment		Minor Impairment		Minor Impairment	
	Present	Absent	Present	Absent	Present	Absent
Moderately elevated						
Systolic or diastolic	152	124	146	125	128	120
Systolic and diastolic	225	184	197	170	161	147
Markedly elevated						
Systolic or diastolic	263	209	218	174	207	179
Systolic and diastolic	420	335	266	337	228	223

*Mortality ratio for all persons insured as standard risks=100 percent.

†Moderately elevated: systolic pressure of 138-147 mm.; diastolic pressure of 83-92 mm. Markedly elevated: systolic pressure of 148-177 mm.; diastolic pressure of 93-102 mm. Diastolic readings at fifth phase: auscultatory reading taken at the point of complete cessation of sound.

Note: These data relate to standard and to substandard risks as a group.

Source: Derived from *Build and Blood Pressure Study, 1959* Society of Actuaries.

TABLE 2—MORTALITY FROM SELECTED CAUSES AMONG MEN WITH ABOVE-AVERAGE BLOOD PRESSURE, SEPARATELY FOR THOSE WITH AND THOSE WITHOUT MINOR IMPAIRMENTS

Mortality Ratios for Various Degrees of Elevated Blood Pressure
Men Accepted for Ordinary Insurance in 1935-53
Traced to Policy Anniversary in 1954. Ages 15-69 at Issue

Degree of Elevated Blood Pressure†	Mortality Ratio (Percent)*									
	Heart and Circulatory Diseases		Vascular Lesions, Central Nervous System		Nephritis		Diabetes		Digestive Diseases	
	Minor Impairment		Minor Impairment		Minor Impairment		Minor Impairment		Minor Impairment	
	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent
Moderately elevated										
Systolic or diastolic.....	150	132	159	146	165	148	126	105	173	121
Systolic and diastolic...	195	172	283	226	295	265	265	123	165	143
Markedly elevated										
Systolic or diastolic.....	242	195	376	275	213	303	313	199	204	161
Systolic and diastolic...	291	292	545	661	*525*	*475*	‡	‡	262	172

*Mortality ratio for all persons insured as standard risks=100 percent.
†For definitions see Table 1.
‡Fewer than 10 deaths. Figures in italics based on 10-24 deaths.
Note: These data relate to standard and to substandard risks as a group.
Source: Derived from *Build and Blood Pressure Study, 1959*, Society of Actuaries.

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moderate elevation of *either* systolic *or* diastolic blood pressure and with minor impairments was 152 percent, compared with 124 percent for those without known minor impairments — a difference of 28 percentage points; where *both* systolic and diastolic pressures were markedly elevated, the mortality ratios were 420 percent and 335 percent, respectively, or a difference of 85 percentage points. In general, the mortality ratios and also the differences between those with and those without minor impairments decreased with advance in age at issue.

The cardiovascular-renal diseases accounted for the major part of the excess mortality among men with elevated blood pressure who also had minor impairments. As may be seen in Table 2, the mortality ratios tended to be particularly high for nephritis and for vascular lesions of the central nervous system. Significantly higher mortality from diseases of the digestive tract and from diabetes was also observed in the impaired groups.

Overweight is the most common minor impairment associated with elevated blood pressure. Accordingly, the variations in mortality among moderately overweight men according to blood pressure level are similar to those just noted for the entire group with minor impairments. Supplementary data were also available for men with elevated blood pressure who were sufficiently overweight to warrant limiting them to substandard insurance solely because of excess weight. Even though this insured group was carefully screened, their mortality was definitely higher than that for overweights of lesser degree. The high mortality in the obese group was due in large part to an excessive death rate from cardiovascular disease, particularly vascular lesions of the central nervous system.

Albuminuria of sufficient degree to be considered a minor impairment was also associated with excess mortality, especially at issue ages 30-49; the mortality was high even in cases where only the systolic or the diastolic pressure was markedly elevated. Nephritis showed a larger excess mortality than any of the other important causes of death.

A family history of early cardiovascular disease — considered to be a minor impairment — together with elevated blood pressure produced a particularly unfavorable mortality among men insured at ages 30-49. In this group the death rate from heart and circulatory disease was especially high.

In all major respects the findings of the Build and Blood Pressure Study, 1959, confirm those of earlier investigations.*

*Blood Pressure Study, 1939, The Actuarial Society of America and The Association of Life Insurance Medical Directors; 1951 Impairment Study, Society of Actuaries.

Incidence of Poliomyelitis Decreases

It now appears quite certain that the incidence of poliomyelitis in the United States for the full year 1960 will be appreciably below that for any year since the introduction of the Salk vaccine in 1955, and far below the annual number of cases in the pre-Salk period. On the basis of the 2,127 cases of the disease reported in the first 38 weeks of 1960, it is estimated that there will be approximately 3,000 cases by the year's end. This compares with 8,425 cases reported for 1959, and with 5,485 for 1957, the smallest number for any year since 1942. In 1955, about 29,000 cases were reported, and in the immediate pre-Salk era, 1950-54, the annual number averaged close to 39,000.

Of the poliomyelitis cases reported so far in the current year, 1,431, or 67 percent of the total, were specified as paralytic, compared with 62 percent a year ago. The number of paralytic cases reported to date is not appreciably

INCIDENCE OF POLIOMYELITIS BY GEOGRAPHIC DIVISION

United States, 1950-54 to 1959

Area	Cases per 100,000 Population					
	1959	1958	1957	1956	1955	1950-54*
United States	4.8	3.3	3.2	9.1	17.6	24.9
New England	4.1	0.9	0.9	2.6	57.7	15.1
Middle Atlantic	2.4	2.1	1.0	3.6	12.6	15.8
East North Central	3.4	5.6	3.7	12.1	20.4	28.4
West North Central	9.8	2.8	3.0	10.7	14.2	42.5
South Atlantic	5.1	3.4	3.5	6.2	10.2	17.9
East South Central	7.3	3.2	3.5	6.5	8.9	20.5
West South Central	6.8	4.8	6.6	15.2	17.9	29.3
Mountain	3.0	3.1	3.5	13.7	18.5	35.8
Pacific	4.7	1.8	4.1	13.9	17.6	30.1

*Annual average.

Source of basic data: The National Foundation and the National Office of Vital Statistics.

different from that for the like period of 1957, although the total number of cases is less than half that reported three years ago.

The table above shows the recent trend in the incidence of poliomyelitis by geographic division. In all nine areas, the number of cases per 100,000 population was lower in each of the years 1956 through 1959 than in 1955 or the period immediately preceding. In the Middle Atlantic States, for example, the case rate per 100,000 population decreased from 15.8 in 1950-54 to 12.6 in 1955, then fell sharply to 1.0 in 1957, after which it rose moderately to 2.4 in 1959. The fluctuations in the poliomyelitis case rate have been even more marked in the New England States. In that area, the rate in 1955 was 57.7 per 100,000, or nearly 4 times that in 1950-54; it fell precipitously to 2.6 in 1956, and further to less than 1 per 100,000 in 1957 and 1958. Although the case rate rose to 4.1 per 100,000 in 1959, this was still only about one fourth that in the pre-Salk period and less than one tenth that in 1955.

The decreased incidence of poliomyelitis since the introduction of the Salk vaccine is of course reflected in the record of individual States, not shown in the table because of space limitations. In 1959, only 7 States in continental United States had case rates of 10 or more per 100,000 population, the highest being Arkansas with a rate of 17.7. In 1957, there was not a single State with a case rate as high as 10 per 100,000. In contrast,

39 States had case rates exceeding 10 per 100,000 in 1955; in 1950-54, not a single State had a rate as low as 10.

It now appears that poliomyelitis can be virtually eradicated in the United States. The Salk vaccine has proved to be a potent weapon against the disease, but unfortunately large sections of the population have failed to avail themselves of its benefits. By the middle of next year it is expected that an oral vaccine will be available in large quantities. In the meantime, the Public Health Service urges that the widest use be made of the Salk vaccine.

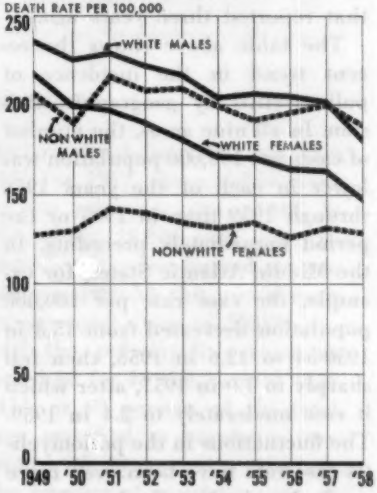
Fatal Accidents in Later Life

LIFE has become safer for older people in the United States. The accident death rate at ages 65 and over has decreased from 224 per 100,000 in 1949 to 164 in 1958, or more than 25 percent in less than a decade. It is clear from the accompanying chart, however, that the improvement represents very largely the gains made in the white population. Among white men aged 65 and over, the accident death rate followed a fairly steady downward course, decreasing more than one fifth between 1949 and 1958—from 237 to 183 per 100,000. Among white females the record was even more favorable, the rate dropping without interruption from 219 to 149 per 100,000, or nearly one third.

The lowered accident death toll among elders in the white population reflects principally the reduction in mortality from falls. As may be seen in the table on page 9, the death rate from accidental falls among white men aged 65 and over averaged 87.1 per 100,000 in 1957-58; in 1949 it was 113.6. Among white women the rates for the two periods were 112.2 and 171.7 per 100,000, respectively. Despite these favorable trends, falls are still by far the leading cause of accidental death at ages 65 and over. Among

MORTALITY FROM ACCIDENTS AGES 65 AND OVER

By Color and Sex
United States, 1949-1958



Source of basic data: Reports of National Office of Vital Statistics.

males, falls account for nearly one third of all fatal injuries at ages 65-74, for half the total at ages 75-84, and for three fourths at ages 85 and over. The proportions are even higher for females.

Motor vehicle accidents rank second as a cause of fatal injury at ages 65 and over. In fact, among men at ages 65-74, they are responsible for more deaths than falls. In 1957-58, motor vehicle accidents accounted for 30 percent of the total accident mortality among white men at ages 65 and over, and for 15 percent of the total among white females. Unlike the mortality from falls, which rises very sharply throughout the advanced ages, the death rate from motor vehicle accidents reaches a peak at ages 75-84 and then decreases somewhat. A considerable proportion of the older people killed in motor vehicle accidents are pedestrians. Among the men at ages 65 and over the proportion is somewhat over two fifths; among the women it is about one third.

Fires and burns by other means

MORTALITY FROM ACCIDENTS, BY TYPE, AGES 65 AND OVER

White Persons, By Sex, United States, 1957-58

Type of Accident	Average Annual Death Rate Per 100,000							
	White Males				White Females			
	Ages 65 and over	65-74	75-84	85 and over	Ages 65 and over	65-74	75-84	85 and over
Accidents—total	193.3	130.7	263.1	667.4	157.3	66.7	224.1	820.8
Falls	87.1	39.0	131.3	502.2	112.2	31.4	116.3	732.2
Motor vehicle—total	58.4	51.9	72.2	70.9	22.5	21.7	25.2	18.3
Collision with pedestrian*	25.1	19.6	35.5	44.4	7.7	6.8	10.0	7.1
Fires and burns by other means	13.2	9.0	19.6	36.5	10.0	5.9	15.9	25.3
Drowning†	3.9	3.5	4.9	5.3	0.6	0.6	0.8	0.4
Machinery	3.4	3.9	2.9	0.6	0.1	0.1	—	0.1
Railway	2.7	2.4	3.1	4.7	0.5	0.4	0.6	0.6
Absorption of poisonous gas	2.2	1.9	2.6	4.0	0.9	0.7	1.2	2.1
Firearm	1.8	2.1	1.4	0.5	0.1	0.1	0.1	0.1
Poisoning by solids and liquids	1.1	1.1	0.9	1.0	0.6	0.6	0.6	0.8
All other	19.7	15.9	24.2	41.7	10.0	5.2	13.4	40.9

*Traffic.
†Excluding water transportation.
Source of Basic Data: Reports of National Office of Vital Statistics.

rank next in numerical importance as a cause of accidental death among older people. The chances of death from this cause increase rapidly with advance in age. Thus, among white men the death rate in 1957-58 rose from 9.0 per 100,000 at ages 65-74 to 19.6 at 75-84 years, and further to 36.5 at ages 85 and over. Among white females also, the death rate from fires and burns by other means was about 4 times as high at ages 85 and over as at 65-74 years. The remaining causes of accidental death include drowning, injury by machinery, railway mishaps, firearms, and poisoning by gas, solids, or liquids; all of these take a much larger toll of life among men than women.

Altogether, accidents among people at ages 65 and over (including the nonwhite population) are responsible for about 25,000 deaths a year in the United States. Many times that number of elders sustain nonfatal injuries of a more or less serious nature. Data derived from the U. S. National Health Survey for the year July 1957—June 1958 show that about 3,625,000 people at ages 65 and over suffered injuries which involved at least one day of restricted activity or medical attendance. Thus, 1 out of every 4 people at these ages sustained a fairly serious accident during the year. Of the total injured, 2,739,000, or three fourths, were medically attended.

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Company's Exhibit at the American Public Health Association Meeting

Everyone attending the 88th Annual Meeting of the American Public Health Association in San Francisco, California, October 31-November 4, is cordially invited to visit the Metropolitan Life Insurance Company exhibit, **"PREVENTION: THE KEY TO WEIGHT CONTROL,"** displayed in booths 932 and 934, Civic Auditorium.

The exhibit stresses the importance of preventing overweight in young adulthood in order to avoid health hazards in middle life.

Health education materials offering specific suggestions and guidance will accompany the exhibit.

MORTALITY FROM SELECTED CAUSES

Industrial Policyholders, Metropolitan Life Insurance Company

August 1960

Cause of Death	Annual Rate per 100,000 Policyholders*				
	August		Year to Date		
	1960†	1959†	1960†	1959†	1958
All Causes	629.2	604.1	696.4	680.3	680.7
Tuberculosis (all forms)	5.0	4.7	5.9	5.7	7.1
Communicable diseases of childhood	0.1	—	0.1	0.1	0.3
Acute poliomyelitis	0.2	0.3	0.1	0.1	‡
Malignant neoplasms	140.4	137.7	144.9	143.7	140.3
Digestive system	48.7	46.3	48.5	49.3	46.7
Respiratory system	21.4	22.7	21.9	21.5	19.8
Diabetes mellitus	14.2	12.0	15.9	15.5	16.1
Diseases of the cardiovascular-renal system	331.4	311.6	372.9	365.0	362.4
Vascular lesions, central nervous system	63.3	60.0	69.8	69.1	68.2
Diseases of heart	242.5	227.4	275.8	268.9	268.4
Chronic rheumatic heart disease	11.2	8.6	11.5	10.9	11.8
Arteriosclerotic and degenerative heart disease	192.0	182.2	220.8	213.3	212.3
Diseases of coronary arteries	115.9	106.3	129.7	126.9	121.1
Hypertension with heart disease	26.0	24.1	30.9	32.0	33.2
Other diseases of heart	13.3	12.5	12.7	12.6	11.1
Nephritis and nephrosis	6.0	6.6	7.0	7.5	7.6
Pneumonia and influenza	14.7	14.9	24.9	19.8	23.2
Complications of pregnancy, childbirth	0.4	0.4	0.7	0.7	0.9
Suicide	6.0	7.1	6.3	6.8	6.0
Homicide	2.6	2.6	2.8	2.8	2.8
Accidents—total	32.2	35.6	32.6	33.5	34.1
Motor vehicle	12.1	15.4	13.6	14.3	14.6
All other causes	82.0	77.2	89.3	86.6	87.5

*These death rates relate to persons insured under Weekly or Monthly premium-paying Industrial policies and Monthly premium-paying Ordinary policies for small amounts of insurance.

†Beginning with January 1959, deaths have been classified according to the Seventh Revision of the International List of Causes of Death. Consequently, the death rates for individual causes in 1959 and 1960 are not strictly comparable with those for earlier periods. Rates for 1960 are provisional.

‡Less than 0.05.

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MORTALITY FROM ALL CAUSES

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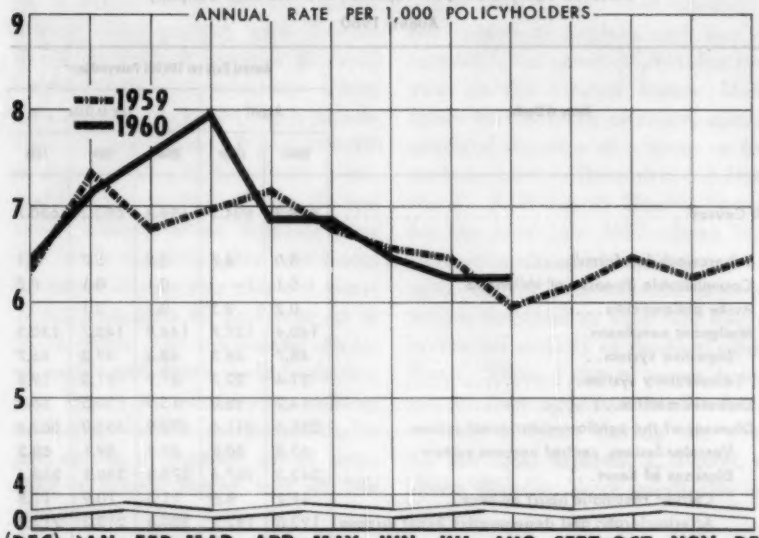

	(DEC)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1959		7.4	6.8	7.0	7.2	6.8	6.6	6.5	6.0	6.2	6.5	6.3	6.5
1960		7.2	7.6	8.0	6.9	6.9	6.5	6.3	6.3				

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